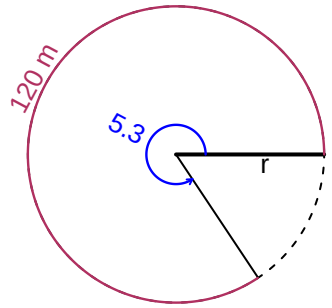
Name: Date:

Trig Final (SLTN v697)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The angle measure is 5.3 radians. The arc length is 120 meters. How long is the radius in meters?

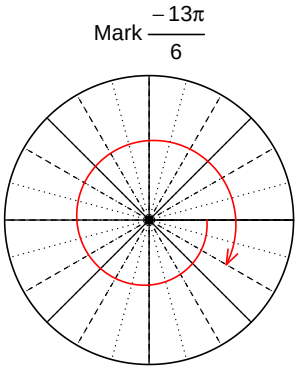


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

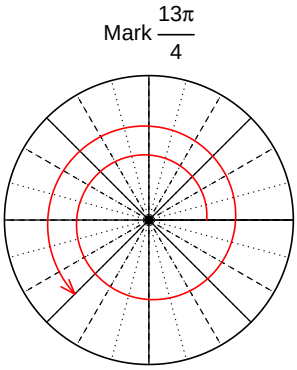
$r = 22.64$ meters.

Question 2

Consider angles $\frac{-13\pi}{6}$ and $\frac{13\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\sin\left(\frac{-13\pi}{6}\right)$ and $\cos\left(\frac{13\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\sin(-13\pi/6)$



Find $\cos(13\pi/4)$

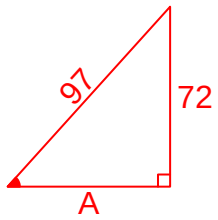
$\sin(-13\pi/6) = \frac{-1}{2}$

$\cos(13\pi/4) = \frac{-\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{-72}{97}$, and θ is in quadrant III, determine an exact value for $\tan(\theta)$.

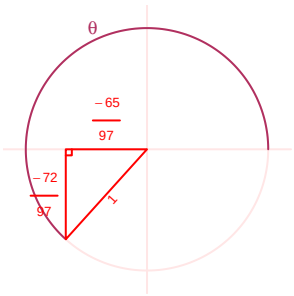
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 72^2 = 97^2$$
$$A = \sqrt{97^2 - 72^2}$$
$$A = 65$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\tan(\theta) = \frac{\frac{-72}{97}}{\frac{-65}{97}} = \frac{72}{65}$$

Question 4

A mass-spring system oscillates vertically with a frequency of 7.51 Hz, an amplitude of 4.25 meters, and a midline at $y = -2.09$ meters. At $t = 0$, the mass is at the midline and moving up. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = 4.25\sin(2\pi 7.51t) - 2.09$$

or

$$y = 4.25\sin(15.02\pi t) - 2.09$$

or

$$y = 4.25\sin(47.19t) - 2.09$$